

PG-FP6

R20AN0573EJ0100

Rev.1.00

Jun. 26, 2020

Usage of Communications Commands

Introduction

This document introduces how to use communications commands via a serial interface for programming by the PG-FP6. Using these commands also enables automated control of programming.

Target Devices

RA family

RL78 family

RX family

RH850 family

Renesas Synergy™ microcontrollers

RE family

Power-management ICs

Renesas USB Power Delivery family (C30 group)

ICs for driving motors and actuators (ICs for motor control)

SuperH family

V850 family

78K family

R8C family

Contents

1. Overview.....	3
2. Basic Procedure up to the Use of Communications Commands.....	3
2.1 Connecting the Host PC.....	4
2.2 Connecting a Target System.....	4
2.3 Creating a Setting File.....	5
2.4 Executing Commands.....	13
2.5 Executing Commands via the Communications Software.....	14
2.6 Creating a Macro File.....	15
2.7 Executing the Macro File.....	16
3. Examples of Executing Communications Commands from Macro Files.....	17
3.1 Downloading a Parameter File, Setting File, and Program File.....	17
3.2 Programming Multiple Program Files.....	18
3.3 Consecutive Programming with Multiple Sets of Files.....	19
3.4 Executing Multiple Consecutive Commands (e.g. Erasure, Programming, and Verification).....	22
3.5 Programming Unique Code.....	23

3.6 Programming with a Specified PG-FP6 24

3.7 Simultaneous Programming of Multiple Devices from a Single Host PC (Gang Programming)..... 25

1. Overview

The PG-FP6 flash programmer can be run from a host PC by using serial communications commands. Using communications software to manipulate the PG-FP6 also enables automated programming. For details on the PG-FP6, refer to the user's manual.

<https://www.renesas.com/pg-fp6>

2. Basic Procedure up to the Use of Communications Commands

This chapter helps you to understand the sequence of the basic procedures to follow up to the execution of communications commands for the PG-FP6 via communications software, taking the RL78/G13 as an example of the target MCU.

- The descriptions in this chapter apply under the following conditions.

Host PC interface:	USB
Programming area:	Area 0
Target MCU:	R5F100LE (RL78/G13)
Programming GUI:	FP6 Terminal V1.04.01
Communications software:	Tera Term Version 4.105*
Power supply:	5 V supplied from the PG-FP6
Clock supply:	32 MHz (on-chip clock oscillator)
Communications interface:	Single-wire UART (1,000,000 bps)
Security setting:	Disabled
Operations of flash memory:	Erase, programming, and verification
Operating mode:	Chip mode
Flash options:	None

*Official Web site of Tera Term: <http://tssh2.osdn.jp>

- This chapter describes the procedures listed below. Steps 1 to 4 refer to standard operations assuming the use of the FP6 Terminal. If you already understand these steps, start from step 5.
 1. Connecting the host PC and PG-FP6
 2. Connecting a target system
 3. Creating a setting file
 4. Executing commands
 5. Executing commands via communications software
 6. Creating a macro file
 7. Executing the macro file

2.1 Connecting the Host PC

Connect the USB port of the host PC to the PG-FP6 via a USB cable. Also connect the PG-FP6 to the power adapter that comes with the PG-FP6. After that, turn on the power supply switch on the PG-FP6.

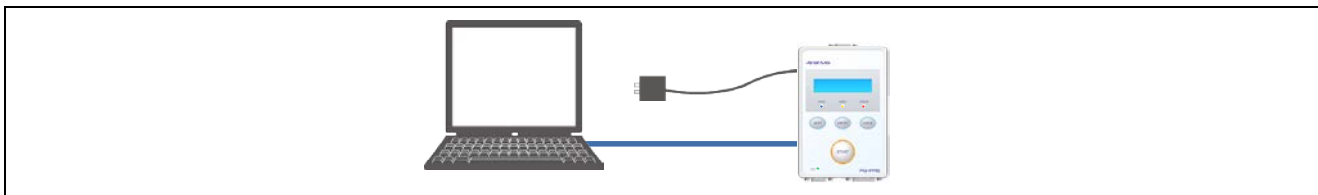


Figure 2.1 Connecting the Host PC

2.2 Connecting a Target System

Connect the target cable of the PG-FP6 to the target system.

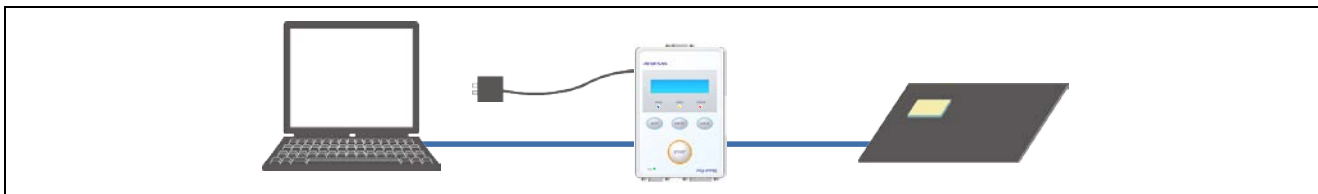


Figure 2.2 Connecting a Target System

2.3 Creating a Setting File

Starting up the FP6 Terminal opens the main window.

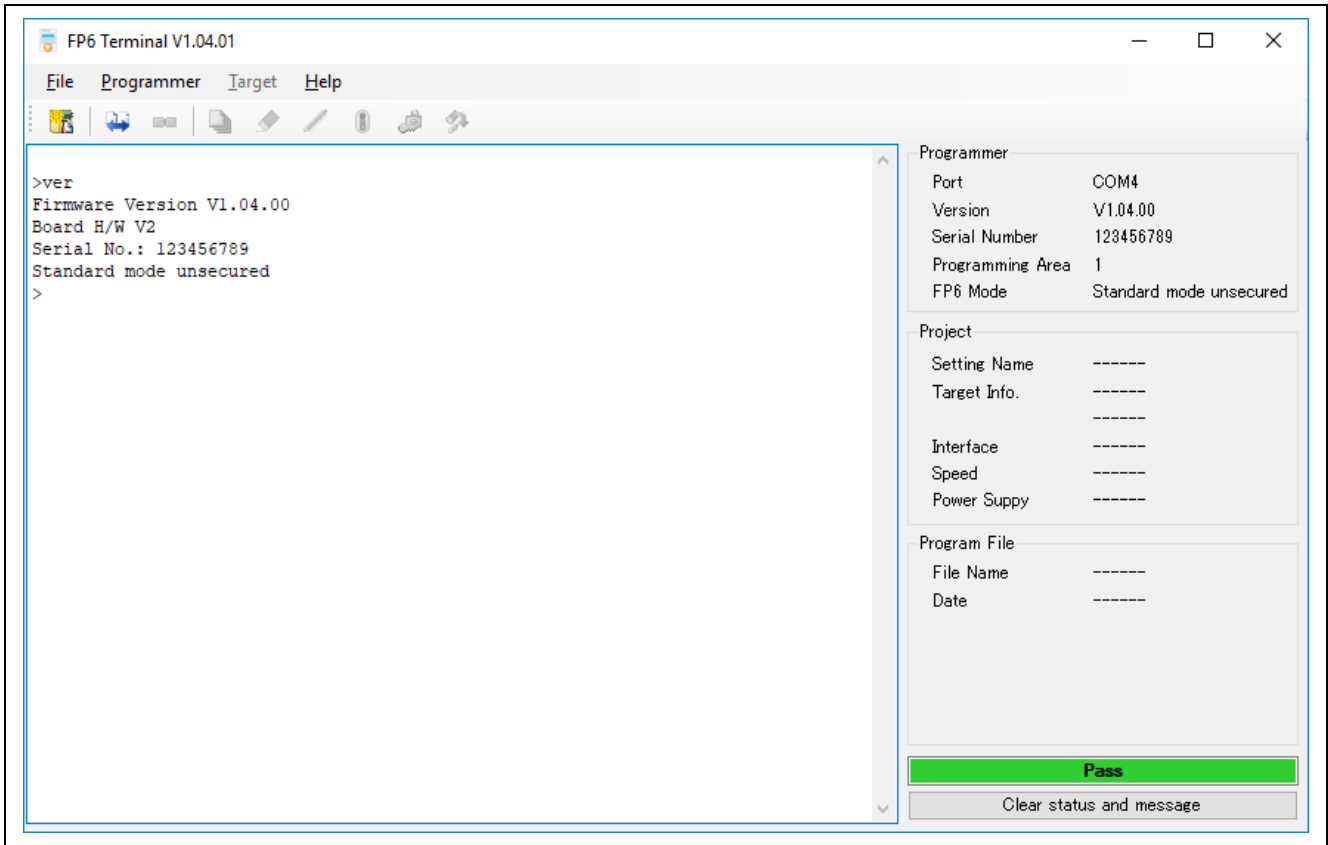


Figure 2.3 Main Window

Select [New Setting File...] from the [File] menu to open the [Create New Setting] dialog box.

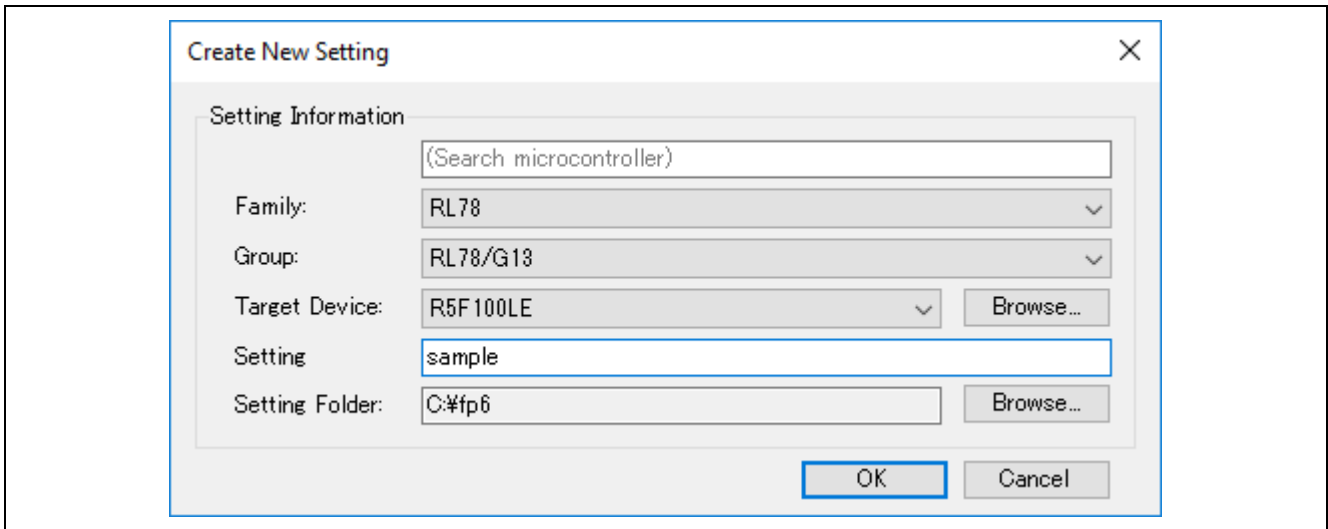


Figure 2.4 [Create New Setting] Dialog Box

Make the following settings.

[Family]: RL78
[Group]: RL78/G13
[Target Device]: R5F100LE
[Setting]: sample
[Setting Folder]: C:\fp6

Clicking on the [OK] button opens the [Setup] dialog box.

Select "C:\fp6\sample.mot" as the program file on the [Program File] tabbed page.

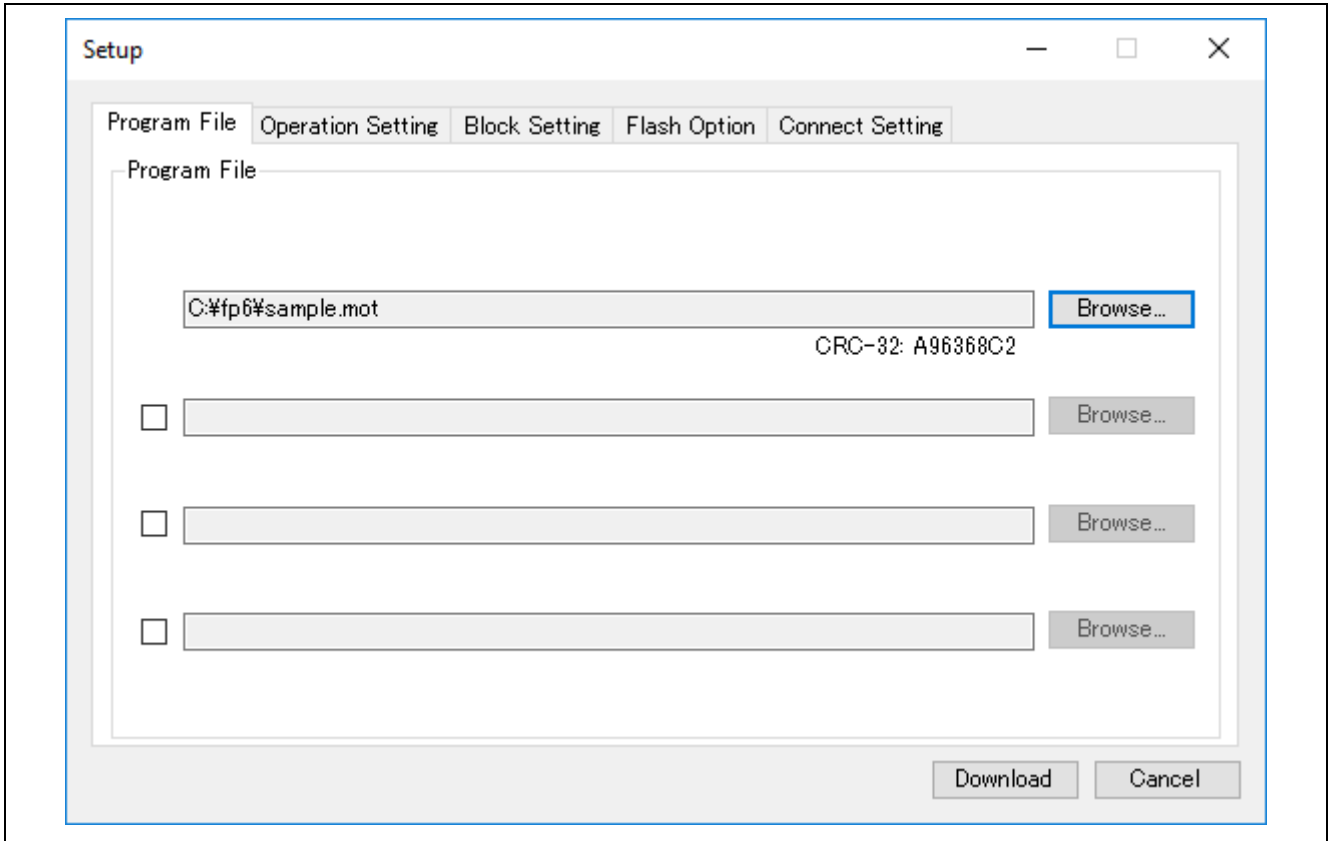


Figure 2.5 [Program File] Tabbed Page

Select [Verify] in the [Command] category on the [Operation Setting] tabbed page.

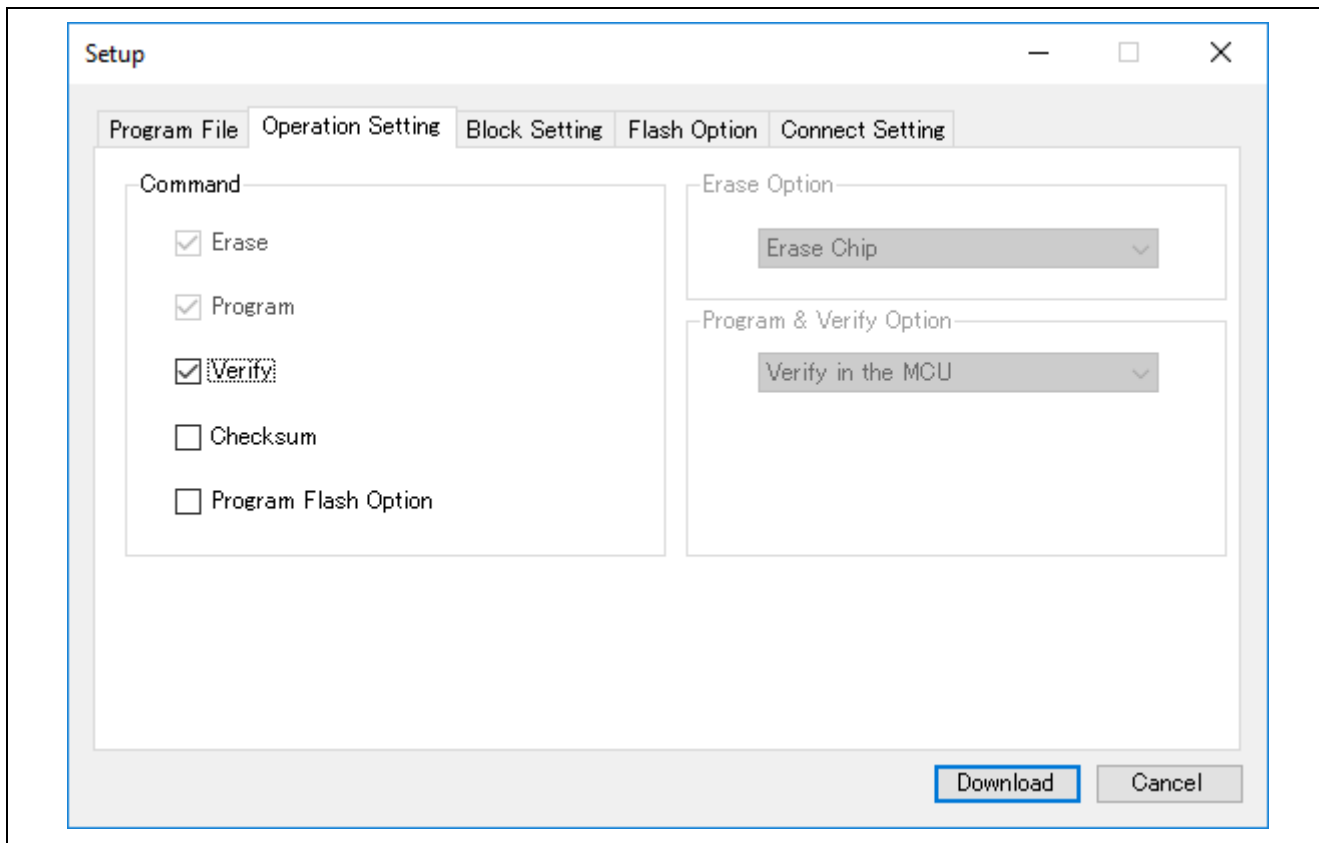


Figure 2.6 [Operation Setting] Tabbed Page

Make sure that [Chip Mode] is selected for [Mode] on the [Block Setting] tabbed page.

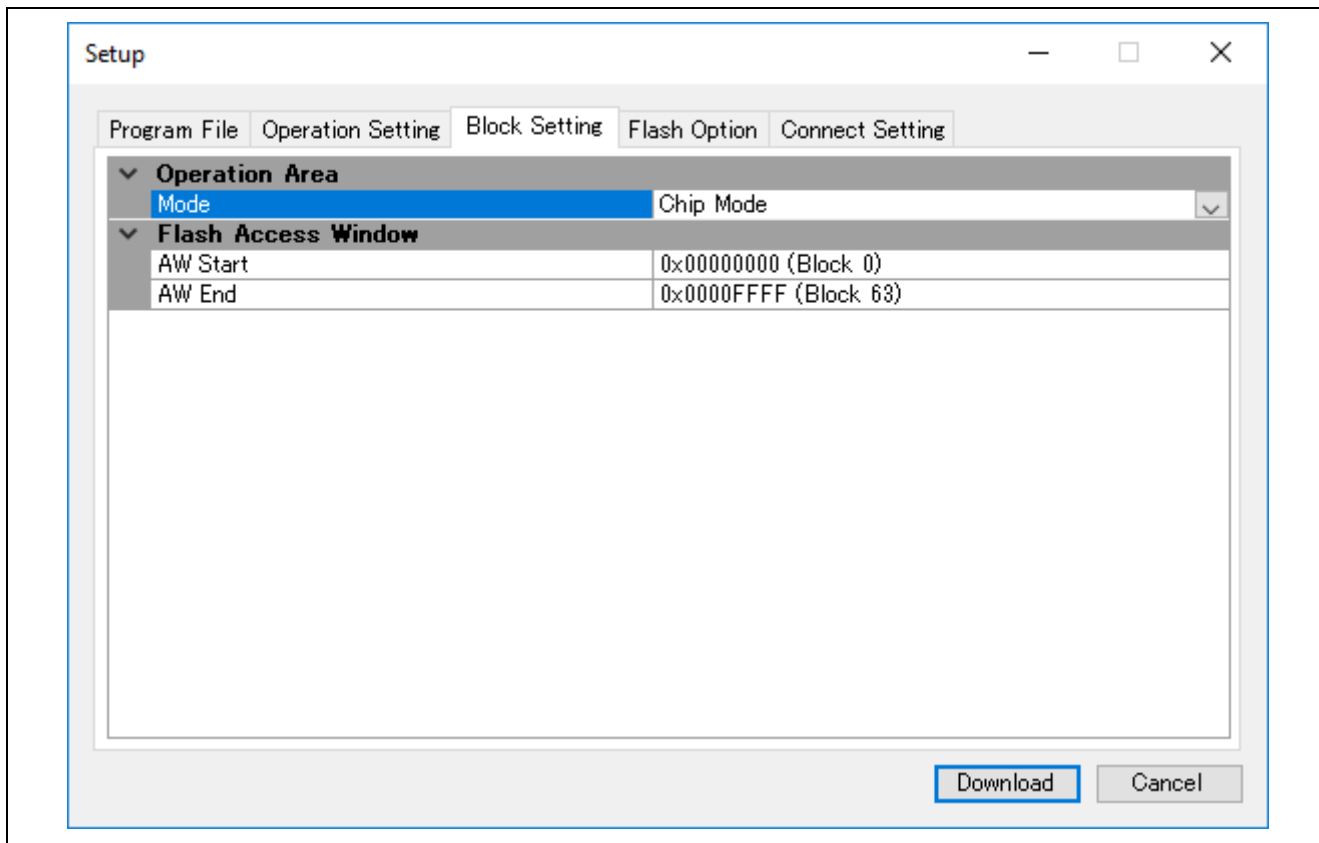


Figure 2.7 [Block Setting] Tabbed Page

Make sure that [Do Nothing] is selected for [Set Option] on the [Flash Option] tabbed page.

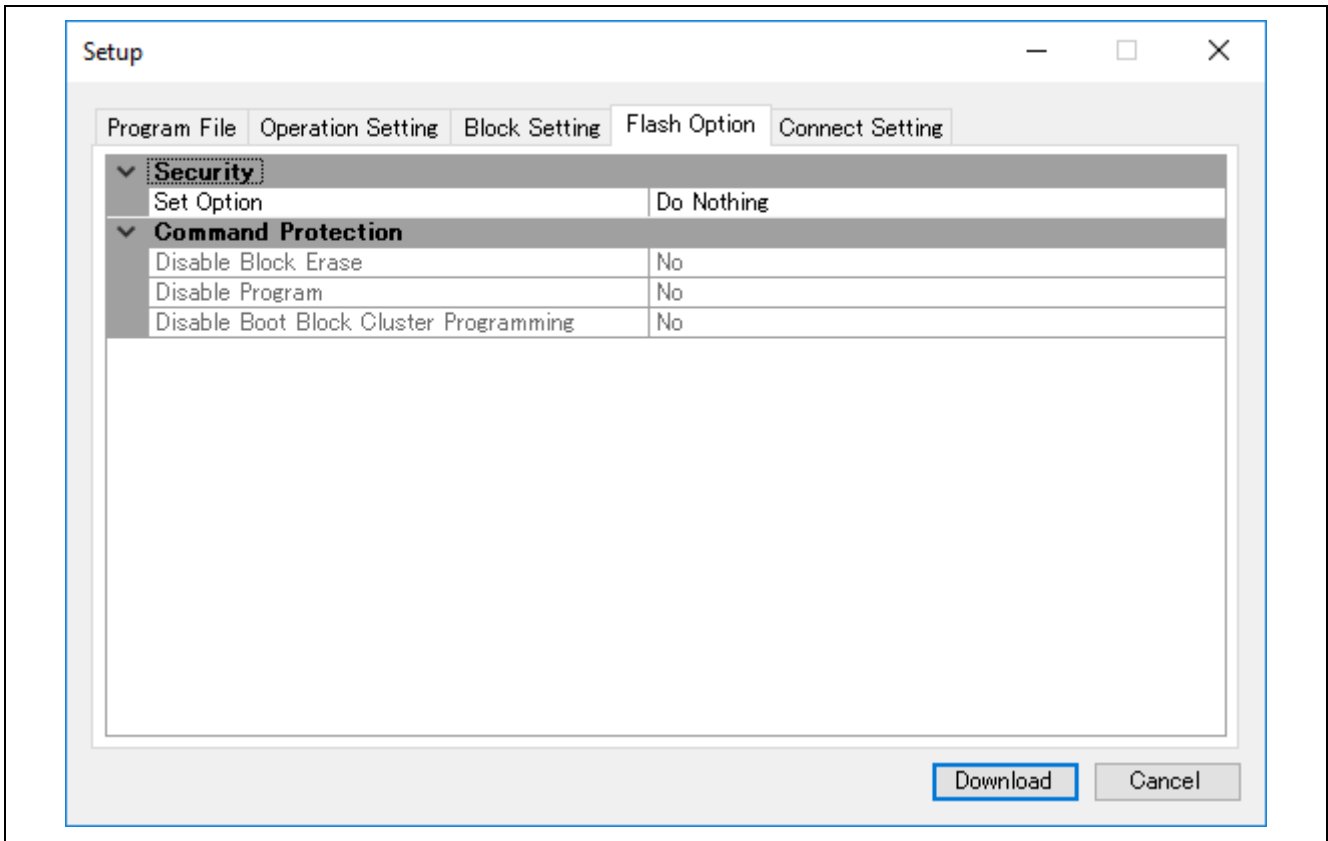


Figure 2.8 [Flash Option] Tabbed Page

On the [Connect Setting] tabbed page, select “1,000,000” as the communications speed. Also make sure that [Power supply from FP6] is selected and the value of VCC is 5.0 V.

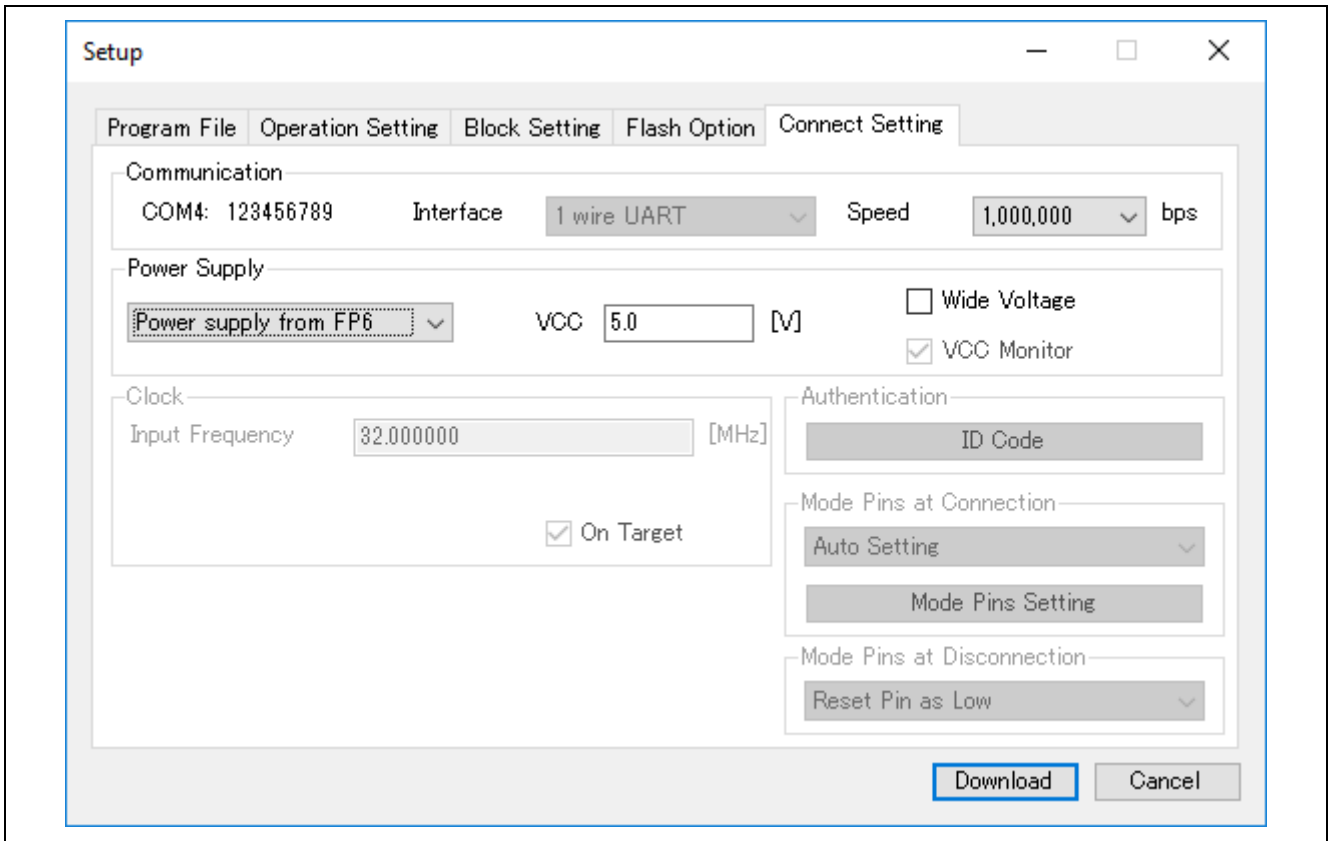


Figure 2.9 [Connect Setting] Tabbed Page

Click on the [Download] button to download a parameter file, setting file, and program file to be stored in the PG-FP6.

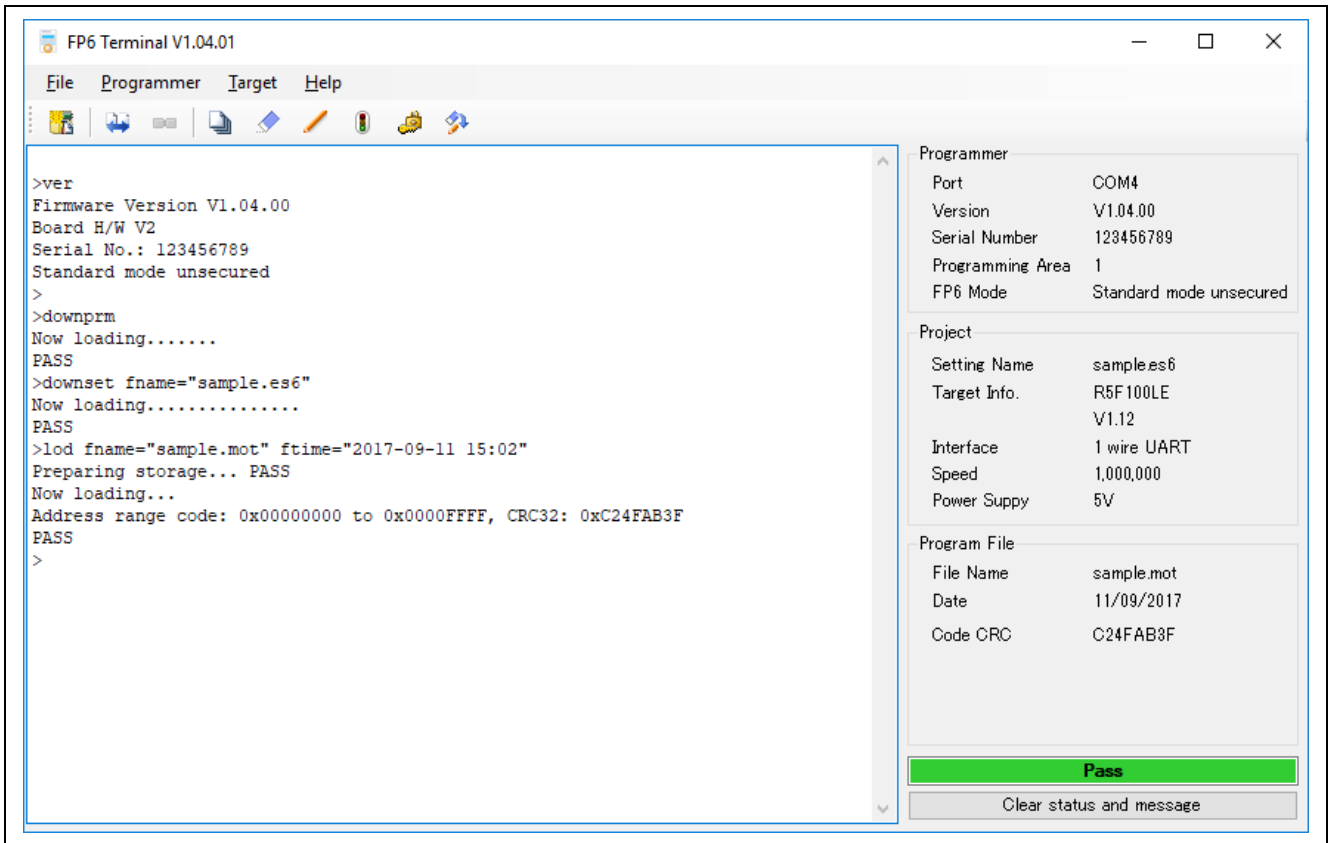


Figure 2.10 Downloading

2.4 Executing Commands

Selecting [Start] from the [Target] menu executes erasure, programming, and verification of the flash memory in the R5F100LE.

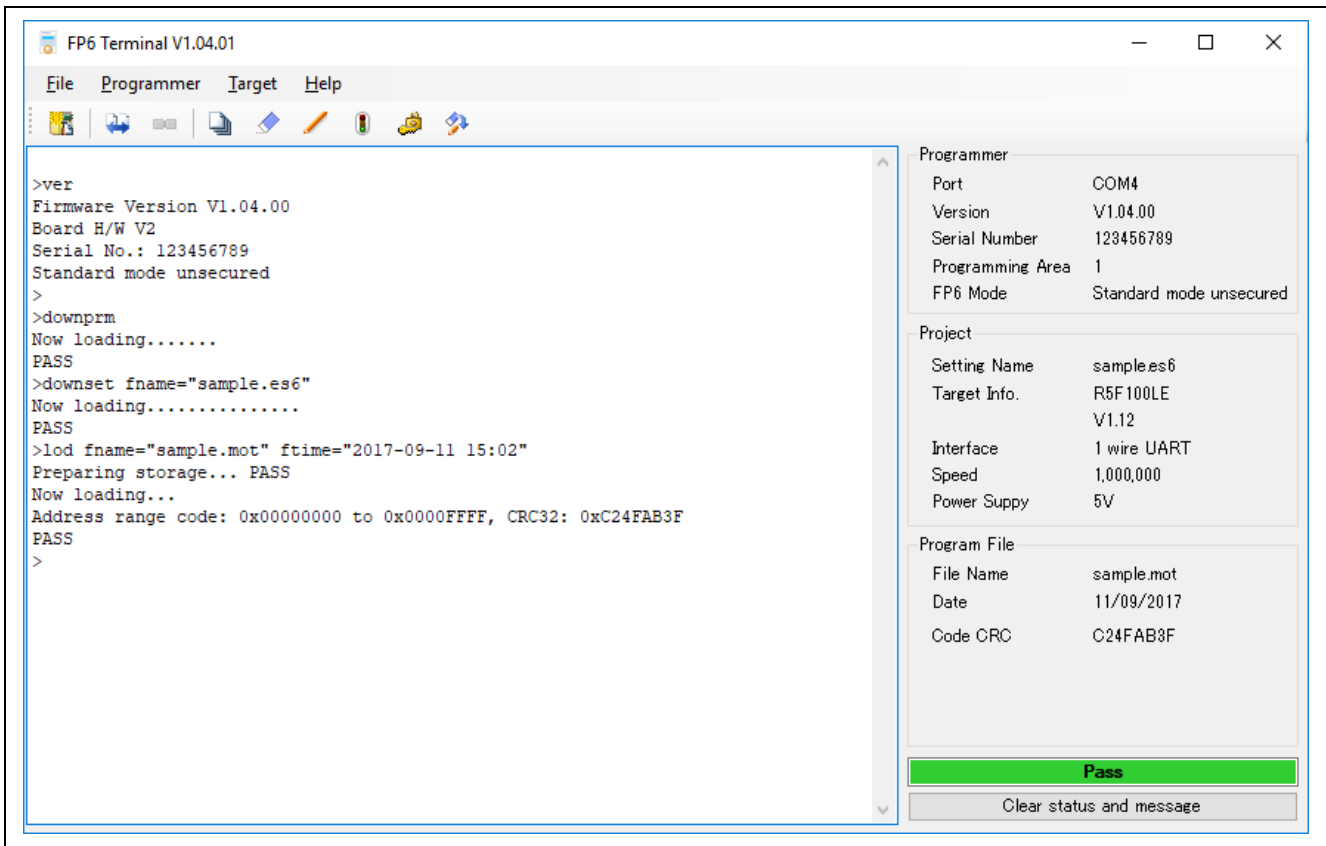


Figure 2.11 Executing Commands

Select [Exit] from the [File] menu to close the FP6 Terminal.

2.5 Executing Commands via the Communications Software

Starting up Tera Term opens the [New connection] dialog box.

Select [Serial] and “COMx: PG-FP6(CDC) (COMx)”, where x indicates the number of the port you wish to use, as the port. Click on the [OK] button to open the main window.

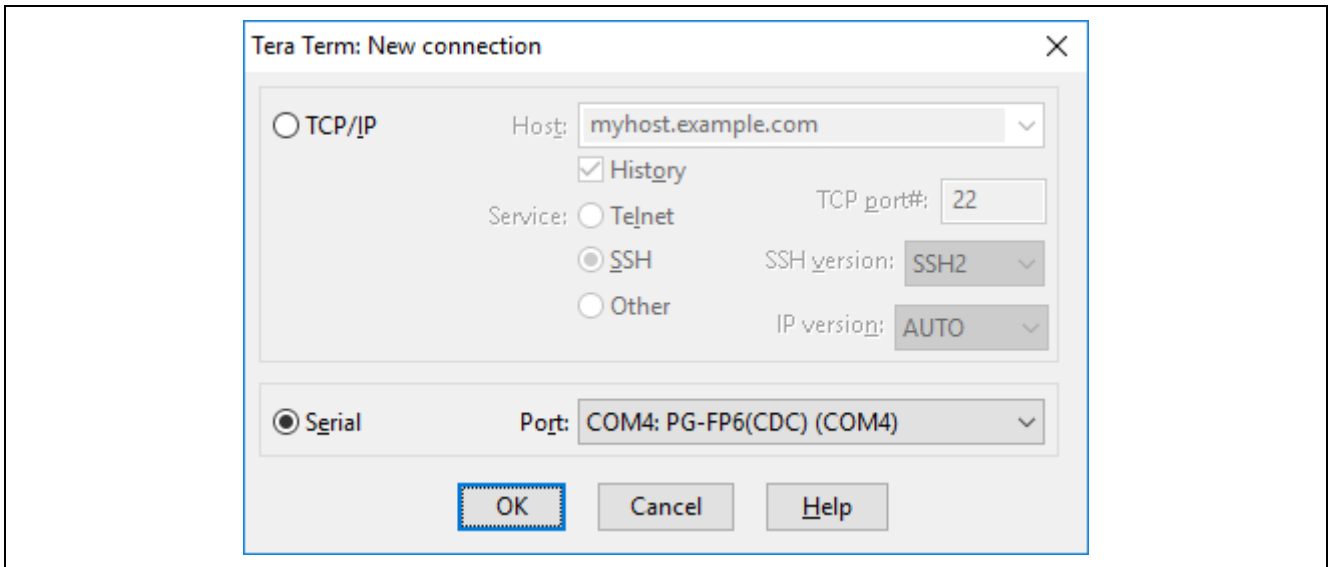


Figure 2.12 [New connection] Dialog Box

Press the Enter key, and the ">" (prompt) character appears on the screen.

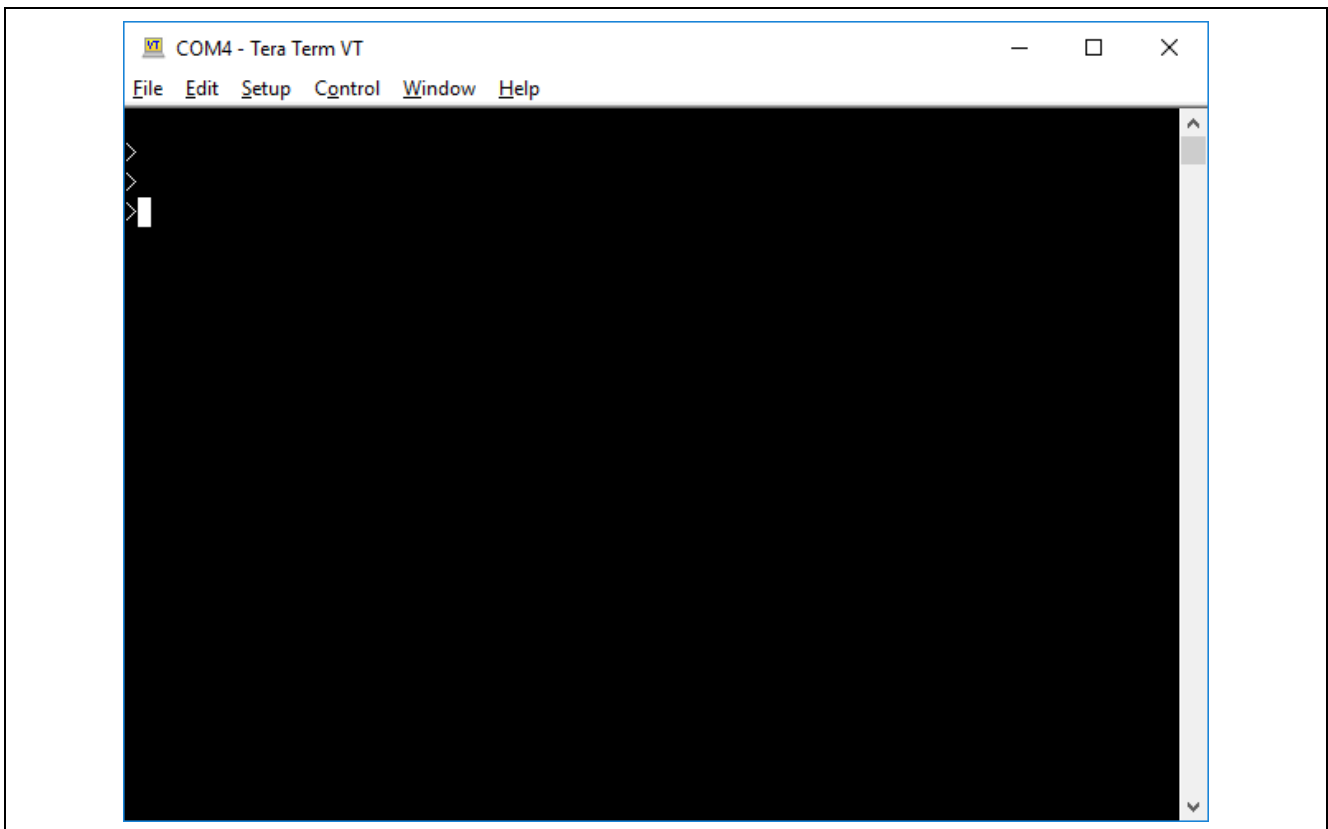
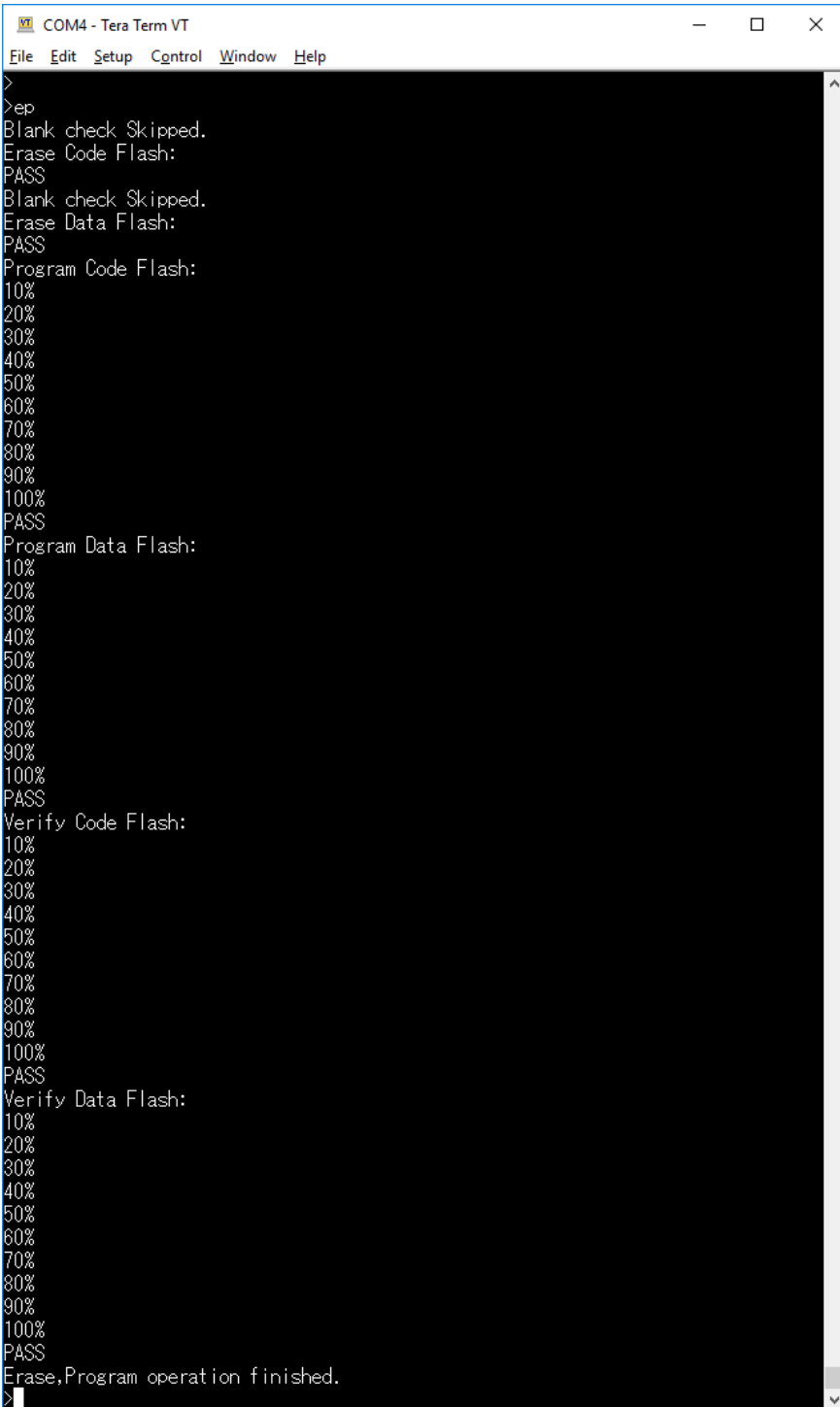


Figure 2.13 Main Window

Enter “ep” to execute erasure, programming, and verification of the flash memory in the R5F100LE.



```
COM4 - Tera Term VT
File Edit Setup Control Window Help
>
>ep
Blank check Skipped.
Erase Code Flash:
PASS
Blank check Skipped.
Erase Data Flash:
PASS
Program Code Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Program Data Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Verify Code Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Verify Data Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Erase,Program operation finished.
>
```

Figure 2.14 Executing a Command

2.6 Creating a Macro File

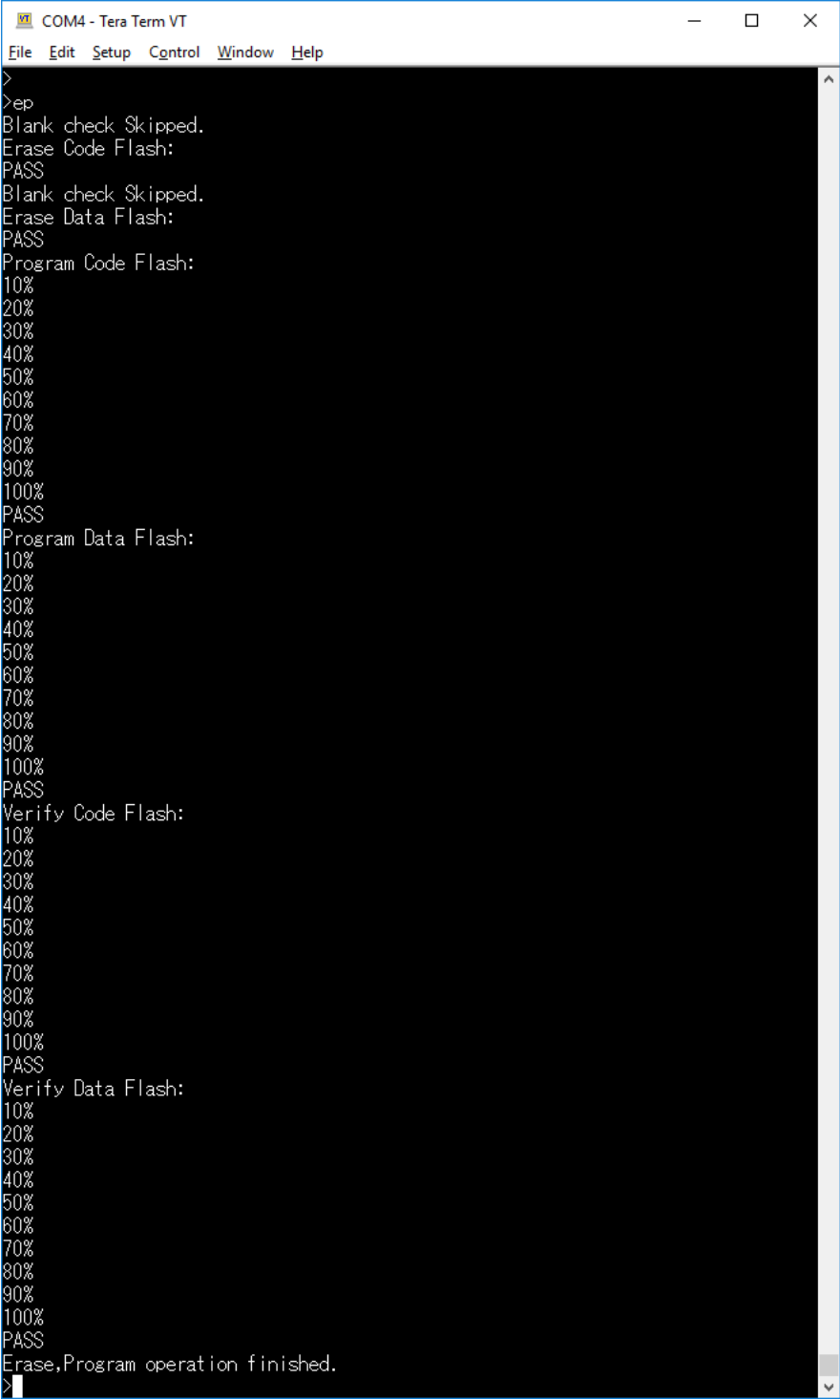
Enter the following code in a text editor and save it as “C:\fp6\sample.ttl”.

```
sendln 'ep'
end
```

Figure 2.15 Creating a Macro File

2.7 Executing the Macro File

Select [Macro] from the [Control] menu and open the "sample.ttl" macro file. This executes erasure, programming, and verification of the flash memory in the R5F100LE.



```
COM4 - Tera Term VT
File Edit Setup Control Window Help
>
>ep
Blank check Skipped.
Erase Code Flash:
PASS
Blank check Skipped.
Erase Data Flash:
PASS
Program Code Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Program Data Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Verify Code Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Verify Data Flash:
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PASS
Erase,Program operation finished.
>
```

Figure 2.16 Executing the Macro File

3. Examples of Executing Communications Commands from Macro Files

This chapter describes automated programming via Tera Term by using macro files that include PG-FP6 communications commands. For details on the communications commands, refer to the user's manual.

<https://www.renesas.com/pg-fp6>

3.1 Downloading a Parameter File, Setting File, and Program File

The **downprm**, **downset**, and **lod** commands can be used to download parameter files, setting files, and programs files, respectively.

The following is an example of downloading the parameter file "R5F100LE.pr5", setting file "sample.es6", and program file "sample.mot".

```
sendln 'downprm'
wait 'Now loading... '
sendfile 'C:\fp6\sample\R5F100LE.pr5' 1
wait '>'
sendln 'downset'
wait 'Now loading... '
sendfile 'C:\fp6\sample\sample.es6' 1
wait '>'
sendln 'lod fname="sample.mot" ftime="2017-09-11 15:02"'
wait 'Now loading... '
sendfile 'C:\fp6\sample.mot' 1
end"
```

Executing this macro file leads to the following output in Tera Term.

```
>downprm
Now loading.....
PASS
>downprm
Now loading.....
PASS
>downset
Now loading.....
PASS
>lod fname="sample.mot" ftime="2017-09-11 15:02"
Preparing storage... PASS
Now loading...
Address range code: 0x00000000 to 0x0000FFFF, CRC32: 0xC24FAB3F
PASS
>
```

3.2 Programming Multiple Program Files

Using the **add** option of the **lod** command allows you to download multiple program files.

The following example is for the downloading and programming of "sample1.mot" and "sample2.mot".

```
sendln 'lod fname="sample1.mot" ftime="2020-06-18 16:24"'
wait 'Now loading...'
sendfile 'C:\fp6\sample1.mot' 1
wait '>'
sendln 'lod add fname="sample2.mot" ftime="2020-06-18 16:26"'
wait 'Now loading...'
sendfile 'C:\fp6\sample2.mot' 1
wait '>'
sendln 'ep'
end
```

Executing this macro file leads to the following output in Tera Term.

```
>lod fname="sample1.mot" ftime="2020-06-18 16:24"
Preparing storage... PASS
Now loading...
Address range code: 0x00000000 to 0x00007FFE, CRC32: 0xC7D7C74C
PASS
>lod add fname="sample2.mot" ftime="2020-06-18 16:26"
Now loading...
Address range code: 0x00008000 to 0x0000FFFF, CRC32: 0x25FDCC28
PASS
>ep
(Omitted)
Erase,Program operation finished.
>
```

3.3 Consecutive Programming with Multiple Sets of Files

You can download multiple sets of files in different programming areas of the PG-FP6 for use in consecutive programming of desired flash areas of the target MCU.

The following shows an example of downloading two pairs of a setting file and program file in programming areas 0 and 1 of the PG-FP6, respectively, along with a single parameter file (for a specific MCU). These files are to be programmed in areas 0 and 1 of the target MCU.

```
sendln 'progarea 0'  
wait '>'  
sendln 'downprm'  
wait 'Now loading...'  
sendfile 'C:\fp6\sample\R5F100LE.pr5' 1  
wait '>'  
sendln 'downset'  
wait 'Now loading...'  
sendfile 'C:\fp6\sample\sample1.es6' 1  
wait '>'  
sendln 'lod fname="sample1.mot" ftime="2020-06-18 16:24"  
wait 'Now loading...'  
sendfile 'C:\fp6\sample1.mot' 1  
wait '>'  
sendln 'progarea 1'  
wait '>'  
sendln 'downprm'  
wait 'Now loading...'  
sendfile 'C:\fp6\sample\R5F100LE.pr5' 1  
wait '>'  
sendln 'downset'  
wait 'Now loading...'  
sendfile 'C:\fp6\sample\sample2.es6' 1  
wait '>'  
sendln 'lod fname="sample2.mot" ftime="2020-06-18 16:26"  
wait 'Now loading...'  
sendfile 'C:\fp6\sample2.mot' 1  
wait '>'  
sendln 'progarea 0'  
wait '>'  
sendln 'ep'  
wait '>'  
sendln 'progarea 1'  
wait '>'  
sendln 'ep'
```

```
end
```

Executing this macro file leads to the following output in Tera Term.

```
>progarea 0
Active Program Area: 0
>downprm
Now loading.....
PASS
>downset
Now loading.....
PASS
>lod fname="sample1.mot" ftime="2020-06-18 16:24"
Preparing storage... PASS
Now loading...
Address range code: 0x00000000 to 0x00007FFE, CRC32: 0xC7D7C74C
PASS
>progarea 1
Active Program Area: 1
>downprm
Now loading.....
PASS
>downset
Now loading.....
PASS
>lod fname="sample2.mot" ftime="2020-06-18 16:26"
Preparing storage... PASS
Now loading...
Address range code: 0x00008000 to 0x0000FFFF, CRC32: 0x25FDCC28
PASS
>progarea 0
Active Program Area: 0
>ep
Blank check Skipped.
Erase Code Flash Block 0000 to 0031:
PASS
Program Code Flash Block 0000 to 0031:
(Omitted)
PASS
Verify Code Flash Block 0000 to 0031:
(Omitted)
```

```
PASS
Erase,Program operation finished.
>progarea 1
Active Program Area: 1
>ep
Blank check Skipped.
Erase Code Flash Block 0032 to 0063:
PASS
Program Code Flash Block 0032 to 0063:
(Omitted)
PASS
Verify Code Flash Block 0032 to 0063:
(Omitted)
PASS
Erase,Program operation finished.
>
```

3.4 Executing Multiple Consecutive Commands (e.g. Erasure, Programming, and Verification)

You can also execute multiple consecutive commands (e.g. erasure, programming, and verification).

The following shows an example of the specification of three commands (**ers**: erasure, **prg**: programming, and **vrf**: verification).

```
sendln 'ers'  
wait '>'  
sendln 'prg'  
wait '>'  
sendln 'vrf'  
end
```

Executing these commands leads to the following output in Tera Term.

```
>ers  
(Omitted)  
PASS  
Erase operation finished.  
>prg  
(Omitted)  
PASS  
Program operation finished.  
>vrf  
(Omitted)  
PASS  
Verify operation finished.  
>
```

3.5 Programming Unique Code

The **serno** command can be used to embed a unique code at a specific address in the program file.

If you wish to use this command, ensure that the unique code function is enabled by the given FP6 Manager setting. Select [Programmer] -> [FP6 Manager] from the menu bar of the FP6 Terminal to open the [FP6 Manager] dialog box and deselect the [Restrict Unique Code Function] checkbox.

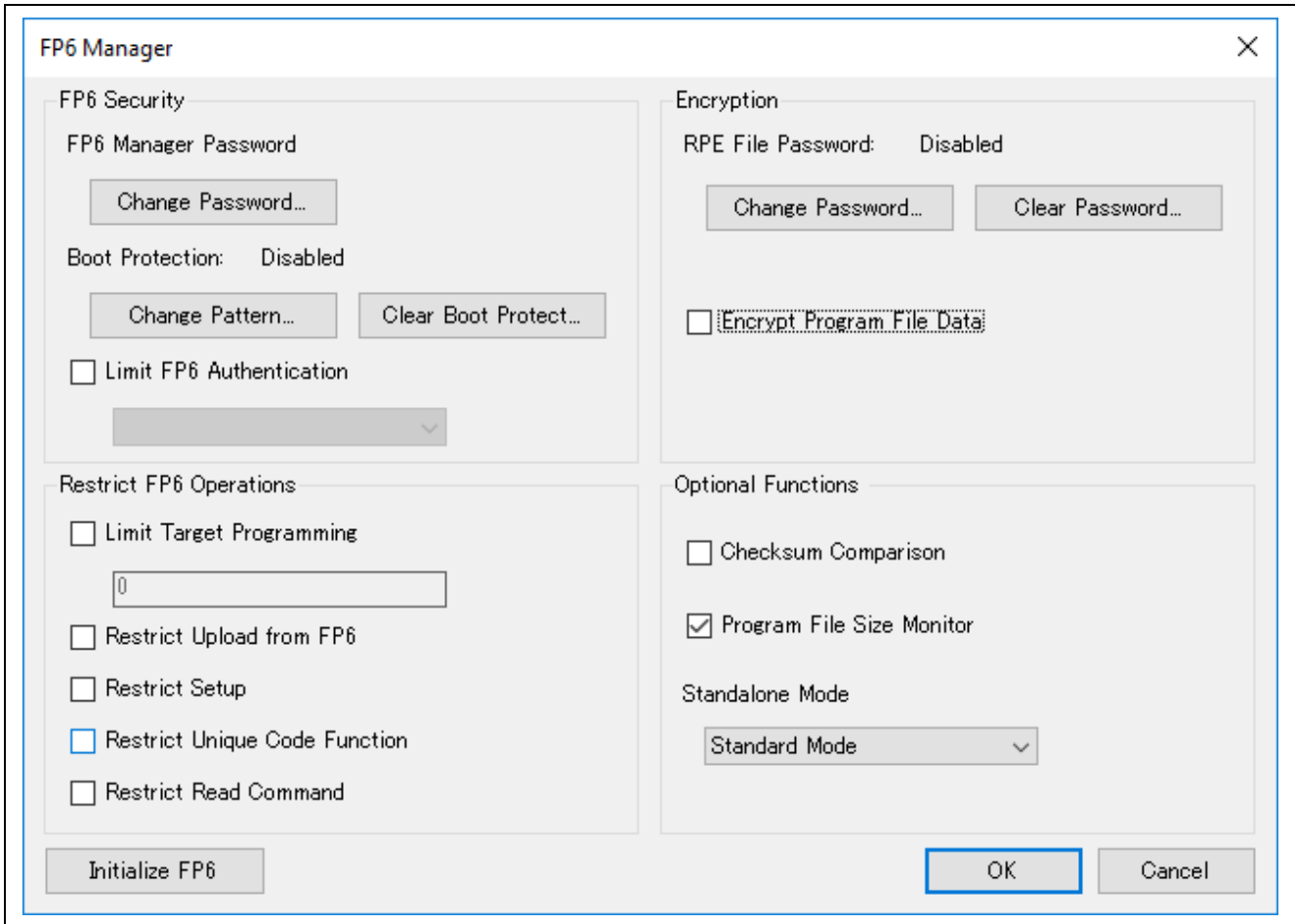


Figure 3.1 [FP6 Manager] Dialog Box

The following shows an example of embedding 0x00010203 at address 0x8000.

```
sendln 'serno 8000 00010203'
wait '>'
sendln 'ep'
end
```

Executing this command leads to the following output in Tera Term.

```
>serno 8000 00010203
OK
>ep
(Omitted)
Erase,Program operation finished.
>
```

3.6 Programming with a Specified PG-FP6

The **connect** command, which is one of the Tera Term macro commands, can be used to specify the number of the COM port to which a PG-FP6 you wish to use is connected.

The following shows an example of programming through a PG-FP6 connected to the COM4 port.

```
connect '/C=4'  
sendln 'ep'  
end
```

Executing this command leads to the following output in Tera Term.

```
>ep  
(Omitted)  
Erase,Program operation finished.  
>
```


3.7 Simultaneous Programming of Multiple Devices from a Single Host PC (Gang Programming)

Multiple Tera Term windows can be opened on a host PC. You can specify the COM port numbers of different PG-FP6 units in those windows to program multiple devices. The **start** command for the Windows command prompt can also be used to set up a batch file that launches multiple batch files which continue running at the same time.

Note: The FP6 Gang Programmer, a programming GUI that comes with the FP6 Terminal, makes simultaneous programming through multiple PG-FP6 units possible.

This section introduces an example where two Tera Term windows are started at the same time in a single environment (which consists of a parameter file, setting file, and program file) to program the devices connected to two PG-FP6 units.

“tppmacro.exe” provided by Tera Term is used to run the macro files.

In advance, download a set of a parameter file, setting file, and program file to two PG-FP6 units.

The following example is the “sample1.bat” batch file, which is used to handle programming through the first PG-FP6 (COM port number: x).

```
tppmacro.exe "C:\fp6\sample1.ttl"  
exit
```

The following example is the “sample1.ttl” macro file, which is used to handle programming through the first PG-FP6 (COM port number: x).

```
connect '/C=x'  
sendln 'ep'  
wait 'Erase,Program operation finished.' 'ERROR'  
    if result=0 goto timeouterror  
    if result=1 goto pass  
    if result=2 goto comerror  
wait '>'  
    if result=0 goto timeouterror  
  
:pass  
messagebox 'Erase,Program operation finished.' 'PASS'  
closett  
end  
  
:comerror  
messagebox 'Command operation error' 'ERROR'  
closett  
end  
  
:timeouterror  
messagebox 'Timeout error' 'ERROR'  
closett  
end
```

The following example is the "sample2.bat" batch file, which is used to handle programming through the second PG-FP6 (COM port number: y).

```
ttpmacro.exe "C:\fp6\sample2.ttl"  
exit
```

The following example is the "sample2.ttl" macro file, which is used to handle programming through the second PG-FP6 (COM port number: y).

```
connect '/C=y'  
sendln 'ep'  
wait 'Erase,Program operation finished.' 'ERROR'  
    if result=0 goto timeouterror  
    if result=1 goto pass  
    if result=2 goto comerror  
wait '>'  
    if result=0 goto timeouterror  
  
:pass  
messagebox 'Erase,Program operation finished.' 'PASS'  
closett  
end  
  
:comerror  
messagebox 'Command operation error' 'ERROR'  
closett  
end  
  
:timeouterror  
messagebox 'Timeout error' 'ERROR'  
closett  
end
```

This example is the "sample.bat" batch file, which executes calls of both "sample1.bat" and "sample2.bat".

```
:LOOP  
start sample1.bat  
start sample2.bat  
PAUSE  
goto LOOP
```

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.

6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.